

**IN THE CLAIMS:**

Please amend claims 37-41, 43, 45-49, 51, 53-57, and 59, and please add new claims 61-66, as set forth below.

Claims 1-36 (Canceled)

1           37.     (Currently Amended) A thermal management system for an integrated  
2 circuit die comprising:  
3 a temperature sensor formed directly on the die, the temperature sensor ~~having an output~~  
4       including a reference voltage source providing a reference voltage, a second  
5       voltage source providing a second voltage proportional to a temperature of the  
6       die, and a comparator coupled with each of the reference voltage and second  
7       voltage sources, the comparator to provide a signal to an output of the temperature  
8       sensor indicative of the die temperature;  
9 a power modulation element formed directly on the die, the power modulation element to  
10       reduce power consumption of the die in response to the output of the temperature  
11       sensor;  
12 a control element formed directly on the die, the control element including at least one  
13       register to provide an enable/disable bit for the thermal management system; and  
14 a visibility element formed directly on the die, the visibility element to indicate a status of  
15       the output of the temperature sensor.

1           38.     (Currently Amended) The thermal management system of claim 37,  
2 wherein the second voltage source comprises a programmable voltage source providing a  
3 programmable voltage ~~temperature sensor comprises:~~  
4 ~~a reference voltage source providing a reference voltage;~~  
5 ~~a programmable voltage source providing a programmable voltage proportional to a~~  
6 ~~temperature of the die; and~~  
7 ~~a comparator having one input coupled via a first signal line to the reference voltage~~  
8 ~~source and another input coupled via a second signal line to the programmable~~  
9 ~~voltage source, the comparator to provide a signal at the output of the temperature~~  
10 ~~sensor in response to the programmable voltage substantially equaling the~~  
11 ~~reference voltage.~~

1           39.     (Currently Amended) The thermal management system of ~~claim 38~~ claim  
2 37, further comprising a pulse dampener ~~coupled to the first signal line, the pulse~~  
3 ~~dampener~~ to at least partially remove electrical noise from the reference voltage.

1           40.     (Currently Amended) The thermal management system of ~~claim 38~~ claim  
2 37, further comprising an analog filter ~~coupled to the second signal line and the first~~  
3 ~~signal line, the analog filter~~ to detect voltage spikes present in the reference voltage and  
4 to add substantially identical voltage spikes to the ~~programmable~~ second voltage.

1           41.     (Currently Amended) The thermal management system of ~~claim 38~~ claim  
2 37, further comprising a digital filter coupled to an output of the comparator, the digital  
3 filter including an up-down counter to count clock pulses, the up-down counter to  
4 increment once for each clock pulse detected when the comparator output is at a first  
5 state and to decrement once for each clock pulse detected when the comparator output is  
6 at a second state.

1           42.     (Previously Presented) The thermal management system of claim 37, the  
2 control element further including at least one register selected from a group consisting of  
3 a register to selectively disengage a specified portion of the thermal management system,  
4 a register to enable the thermal management system in response to an occurrence of an  
5 external event, a register to force the thermal management system active while overriding  
6 a disable bit provided by the at least one register, and a register to allow external software  
7 and hardware to enable the thermal management system.

1           43.     (Currently Amended) The thermal management system of claim 37, the  
2 visibility element including at least one device selected from a group consisting of a  
3 register to indicate ~~the~~ a status of the temperature sensor output, a register to provide a  
4 sticky bit, a counter to count a number of lost clock cycles resulting from operation of the  
5 thermal management system, and circuitry to generate an interrupt when the temperature  
6 sensor output transitions to a different state.

1           44.     (Previously Presented) The thermal management system of claim 37, the  
2 power modulation element to reduce the power consumption of the die by performing at  
3 least one action selected from a group consisting of lowering a supply voltage to the die,  
4 lowering a frequency of a clock signal provided by internal clock circuitry on the die,  
5 performing clock gating of the clock signal, performing clock throttling of the clock  
6 signal, selectively blocking clock pulses of the clock signal, disabling at least one of a  
7 plurality of functional units on the die, limiting instructions sent to at least one of the  
8 plurality of functional units, and changing a behavior of at least one of the plurality of  
9 functional units.

1           45.     (Currently Amended) An apparatus comprising:  
2     a die; and  
3     a thermal management system formed directly on the die, the thermal management  
4         system including  
5                 a temperature sensor, the temperature sensor ~~having an output~~ including a  
6                         reference voltage source providing a reference voltage, a second  
7                         voltage source providing a second voltage proportional to a  
8                         temperature of the die, and a comparator coupled with each of the  
9                         reference voltage and second voltage sources, the comparator to  
10                         provide a signal to an output of the temperature sensor indicative  
11                         of the die temperature;  
12                 a power modulation element to reduce power consumption of the die in  
13                         response to the output of the temperature sensor;  
14                 a control element including at least one register to provide an  
15                         enable/disable bit for the thermal management system; and  
16                 a visibility element to indicate a status of the output of the temperature  
17                         sensor.

1           46.     (Currently Amended) The apparatus of claim 45, wherein the second  
2     voltage source comprises a programmable voltage source providing a programmable  
3     voltage ~~temperature sensor comprises:~~  
4     ~~a reference voltage source providing a reference voltage;~~  
5     ~~a programmable voltage source providing a programmable voltage proportional to a~~  
6                 ~~temperature of the die; and~~  
7     ~~a comparator having one input coupled via a first signal line to the reference voltage~~  
8                 ~~source and another input coupled via a second signal line to the programmable~~  
9                 ~~voltage source, the comparator to provide a signal at the output of the temperature~~  
10                 ~~sensor in response to the programmable voltage substantially equaling the~~  
11                 ~~reference voltage.~~

1           47.     (Currently Amended) The apparatus of ~~claim 46~~ claim 45, further  
2     comprising a pulse dampener ~~coupled to the first signal line, the pulse dampener to at~~  
3     least partially remove electrical noise from the reference voltage.

1           48.     (Currently Amended) The apparatus of ~~claim 46~~ claim 45, further  
2     comprising an analog filter ~~coupled to the second signal line and the first signal line, the~~  
3     analog filter to detect voltage spikes present in the reference voltage and to add  
4     substantially identical voltage spikes to the ~~programmable~~ second voltage.

1           49.     (Currently Amended) The apparatus of ~~claim 46~~ claim 45, further  
2     comprising a digital filter coupled to an output of the comparator, the digital filter  
3     including an up-down counter to count clock pulses, the up-down counter to increment  
4     once for each clock pulse detected when the comparator output is at a first state and to  
5     decrement once for each clock pulse detected when the comparator output is at a second  
6     state.

1           50.     (Previously Presented) The apparatus of claim 45, the control element  
2     further including at least one register selected from a group consisting of a register to  
3     selectively disengage a specified portion of the thermal management system, a register to  
4     enable the thermal management system in response to an occurrence of an external event,  
5     a register to force the thermal management system active while overriding a disable bit  
6     provided by the at least one register, and a register to allow external software and  
7     hardware to enable the thermal management system.

1           51.     (Currently Amended) The apparatus of claim 45, the visibility element  
2     including at least one device selected from a group consisting of a register to indicate ~~the~~  
3     a status of the temperature sensor output, a register to provide a sticky bit, a counter to  
4     count a number of lost clock cycles resulting from operation of the thermal management  
5     system, and circuitry to generate an interrupt when the temperature sensor output  
6     transitions to a different state.

1           52.     (Previously Presented) The apparatus of claim 45, the power modulation  
2 element to reduce the power consumption of the die by performing at least one action  
3 selected from a group consisting of lowering a supply voltage to the die, lowering a  
4 frequency of a clock signal provided by internal clock circuitry on the die, performing  
5 clock gating of the clock signal, performing clock throttling of the clock signal,  
6 selectively blocking clock pulses of the clock signal, disabling at least one of a plurality  
7 of functional units on the die, limiting instructions sent to at least one of the plurality of  
8 functional units, and changing a behavior of at least one of the plurality of functional  
9 units.

1           53.     (Currently Amended) A system comprising:  
2 a memory coupled with a bus; and  
3 a processor coupled with the bus, the processor including a die and a thermal  
4 management system formed directly on the die, the thermal management system  
5 including  
6           a temperature sensor, the temperature sensor ~~having an output~~ including a  
7                     reference voltage source providing a reference voltage, a second  
8                     voltage source providing a second voltage proportional to a  
9                     temperature of the die, and a comparator coupled with each of the  
10                    reference voltage and second voltage sources, the comparator to  
11                    provide a signal to an output of the temperature sensor indicative  
12                    of the die temperature;  
13           a power modulation element, the power modulation element to reduce  
14                    power consumption of the processor in response to the output of  
15                    the temperature sensor;  
16           a control element, the control element including at least one register to  
17                    provide an enable/disable bit; and  
18           a visibility element, the visibility element to indicate a status of the output  
19                    of the temperature sensor.

1           54.     (Currently Amended) The system of claim 53, wherein the second voltage  
2 source comprises a programmable voltage source providing a programmable voltage the  
3 at least one temperature sensor comprising:  
4 a reference voltage source providing a reference voltage;  
5 a programmable voltage source providing a programmable voltage proportional to a  
6 temperature of the die; and  
7 a comparator having one input coupled via a first signal line to the reference voltage  
8 source and another input coupled via a second signal line to the programmable  
9 voltage source, the comparator to provide a signal at the output of the temperature  
10 sensor in response to the programmable voltage substantially equaling the  
11 reference voltage.

1           55.     (Currently Amended) The system of ~~claim 54~~ claim 53, further  
2 comprising a pulse dampener ~~coupled to the first signal line, the pulse dampener to at~~  
3 least partially remove electrical noise from the reference voltage.

1           56.     (Currently Amended) The system of ~~claim 54~~ claim 53, further  
2 comprising an analog filter ~~coupled to the second signal line and the first signal line, the~~  
3 ~~analog filter~~ to detect voltage spikes present in the reference voltage and to add  
4 substantially identical voltage spikes to the ~~programmable~~ second voltage.

1           57.     (Currently Amended) The system of ~~claim 54~~ claim 53, further  
2 comprising a digital filter coupled to an output of the comparator, the digital filter  
3 including an up-down counter to count clock pulses, the up-down counter to increment  
4 once for each clock pulse detected when the comparator output is at a first state and to  
5 decrement once for each clock pulse detected when the comparator output is at a second  
6 state.

1           58.     (Previously Presented) The system of claim 53, the control element  
2 further including at least one register selected from a group consisting of a register to  
3 selectively disengage a specified portion of the thermal management system, a register to  
4 enable the thermal management system in response to an occurrence of an external event,  
5 a register to force the thermal management system active while overriding a disable bit  
6 provided by the at least one register, and a register to allow external software and  
7 hardware to enable the thermal management system.

1           59.     (Currently Amended) The system of claim 53, the visibility element  
2 including at least one device selected from a group consisting of a register to indicate the  
3 a status of the temperature sensor output, a register to provide a sticky bit, a counter to  
4 count a number of lost clock cycles resulting from operation of the thermal management  
5 system, and circuitry to generate an interrupt when the temperature sensor output  
6 transitions to a different state.

1           60.     (Previously Presented) The system of claim 53, the power modulation  
2 element to reduce the power consumption of the processor by performing at least one  
3 action selected from a group consisting of lowering a supply voltage to the die, lowering  
4 a frequency of a clock signal provided by internal clock circuitry on the die, performing  
5 clock gating of the clock signal, performing clock throttling of the clock signal,  
6 selectively blocking clock pulses of the clock signal, disabling at least one of a plurality  
7 of functional units on the die, limiting instructions sent to at least one of the plurality of  
8 functional units, and changing a behavior of at least one of the plurality of functional  
9 units.

1           61.     (New) The thermal management system of claim 37, wherein the  
2 comparator provides a logical high signal if the second voltage substantially equals the  
3 reference voltage and provides a logical low signal if the second voltage is less than the  
4 reference voltage.



1           62.     (New) The thermal management system of claim 38, wherein the  
2 comparator provides a logical high signal if the programmable voltage substantially  
3 equals the reference voltage and provides a logical low signal if the programmable  
4 voltage is less than the reference voltage, and wherein the programmable voltage source  
5 can be programmed such that the logical high signal is provided at a selected threshold  
6 temperature.

1           63.     (New) The apparatus of claim 45, wherein the comparator provides a  
2 logical high signal if the second voltage substantially equals the reference voltage and  
3 provides a logical low signal if the second voltage is less than the reference voltage.

1           64.     (New) The apparatus of claim 46, wherein the comparator provides a  
2 logical high signal if the programmable voltage substantially equals the reference voltage  
3 and provides a logical low signal if the programmable voltage is less than the reference  
4 voltage, and wherein the programmable voltage source can be programmed such that the  
5 logical high signal is provided at a selected threshold temperature.

1           65.     (New) The system of claim 53, wherein the comparator provides a logical  
2 high signal if the second voltage substantially equals the reference voltage and provides a  
3 logical low signal if the second voltage is less than the reference voltage.

1           66.     (New) The system of claim 54, wherein the comparator provides a logical  
2 high signal if the programmable voltage substantially equals the reference voltage and  
3 provides a logical low signal if the programmable voltage is less than the reference  
4 voltage, and wherein the programmable voltage source can be programmed such that the  
5 logical high signal is provided at a selected threshold temperature.